



## Response to Climate Change

### Idemitsu Group's Information Disclosure on Climate Change

We disclose information in accordance with TCFD\* recommendations. We will proactively disclose information to stakeholders by accurately identifying risks and opportunities of climate change in our business through our information disclosure framework.

Area	TCFD recommendations	Idemitsu's disclosure	Page for disclosure
Governance	1. Describe the board's oversight of climate-related risks and opportunities	<ul style="list-style-type: none"> <li>Governance system for climate change</li> </ul>	▶ P.15
	2. Describe management's role in assessing and managing climate-related risks and opportunities	<ul style="list-style-type: none"> <li>Governance system for climate change</li> </ul>	▶ P.15
Strategy	1. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term	<ul style="list-style-type: none"> <li>Identification of risks and opportunities</li> <li>Responding to risks and opportunities</li> </ul>	▶ P.18
	2. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	<ul style="list-style-type: none"> <li>Identification of risks and opportunities</li> <li>Responding to risks and opportunities</li> </ul>	▶ P.18
	3. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	<ul style="list-style-type: none"> <li>Scenario Analysis</li> <li>Business portfolio reform</li> </ul>	▶ P.7, 9, 18
Risk management	1. Describe the organization's processes for identifying and assessing climate-related risks	<ul style="list-style-type: none"> <li>Climate change risk assessment process (Evaluation by each business site and the Safety &amp; Environmental Protection Headquarters)</li> </ul>	▶ P.15, 16, 18
	2. Describe the organization's processes for managing climate-related risks	<ul style="list-style-type: none"> <li>Climate change risk assessment process (Report to the Management Committee and evaluation)</li> </ul>	▶ P.15, 16, 18
	3. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management	<ul style="list-style-type: none"> <li>Climate change risk assessment process</li> </ul>	▶ P.15, 16, 18
Metrics and Targets	1. Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process	<ul style="list-style-type: none"> <li>GHG emissions absolute amount and per unit of production</li> </ul>	▶ P.19
	2. Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG (greenhouse gas) emissions, and the related risks	<ul style="list-style-type: none"> <li>GHG emissions reduction targets</li> </ul>	▶ P.19
	3. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets	<ul style="list-style-type: none"> <li>GHG emissions reduction targets</li> </ul>	▶ P.19

\* TCFD: The Task Force on Climate-Related Financial Disclosures established by the Financial Stability Board in 2015

## Response to Circular Economy

### Concept of Circular Economy

Idemitsu Group recognizes that the goal of realizing a circular economy is to transform the conventional mass production, mass consumption and mass disposal society into a society that minimizes the consumption of natural resources and reduces the burden on the environment as much as possible. We are promoting a variety of initiatives to ensure that renewable resources are consumed within their renewable capabilities, that resources without renewable capabilities are consumed in the most effective manner, or can be shifted to other renewable resources while reducing their use over a long period of time.

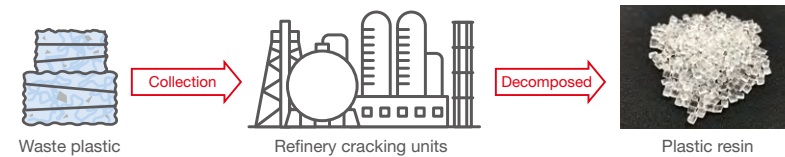
### Examples of Specific Initiatives

We aim to realize sustainable circular business by reusing renewable resources as much as possible and incorporating them into its business supply chain.

Specifically, we are engaged in plastic recycling, solar panel recycling, and, from a long-term perspective, carbon recycling, which treats CO<sub>2</sub> as a resource.

### Plastic Recycling

We are working on the practical application of chemical recycling, in which collected plastics are decomposed and returned to chemical raw materials by using the cracking units for petroleum refining.



The problem of marine plastic waste involves the related all companies in the supply chain. Idemitsu has joined two industry associations and started sharing and exploring information. We are also working to raise awareness of the problem of marine plastics waste within the Company.

#### ■ Japan Initiative for Marine Environment (JaIME)

JaIME was established by five Japanese chemical-related associations (Japan Chemical Industry Association, The Japan Plastics Industry Federation, Plastic Waste Management Institute, Japan Petrochemical Industry Association, and Vinyl Environmental Council).

#### ■ Clean Ocean Material Alliance (CLOMA)

CLOMA is affiliated by 250 companies in the plastic supply chain.

### Recycling of Solar Panels

In collaboration with NEDO, Solar Frontier K.K. of our Group is working on the development of CIS solar cell recycling technology. This recycling technology is characterized by the separation and collection of each material. It has been confirmed that more than 90% of rare metals such as indium and selenium contained in the battery can be collected. We will apply this treatment technology to the recycling of crystalline silicon solar panels. In the future, we plan to construct a pilot line at the Kunitomi Plant, where we will study the feasibility of solar panel recycling technology.



## Response to Circular Economy

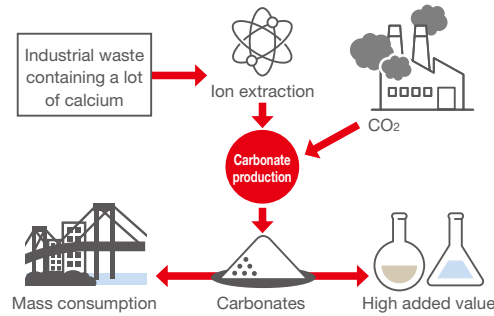
### Carbon Recycling

Considering CO<sub>2</sub> as a carbon resource, we promote carbon recycling by producing various carbon compounds from CO<sub>2</sub> and reusing them for chemicals, fuel, minerals, etc.

Idemitsu is a member of the Working Group on the Roadmap for Carbon Recycling Technologies organized by the Japanese government, and is engaged in research and development of carbonation, artificial photosynthesis, and other technologies.

#### ● Carbonate production

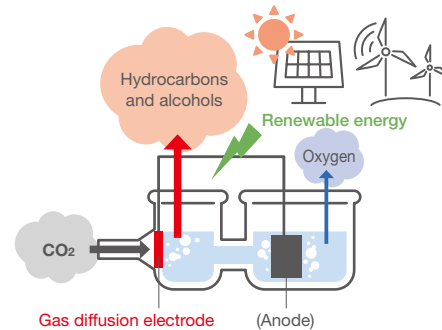
Our company, with the participation of Ube Industries, Ltd., JGC Corporation, and several universities, established the "CCSU (Carbon dioxide Capture and Storage with Utilization) Study Group" as an industry-university collaboration to develop new technologies that convert CO<sub>2</sub> emitted from thermal power plants and factories into resources by utilizing industrial waste containing a large amount of calcium. As the Japanese government promotes the development of technologies for CO<sub>2</sub> recovery and other measures to combat global warming, we are working on the development of new technologies that utilize industrial waste containing high levels of calcium and other substances to react with CO<sub>2</sub> for production of carbonate and added-value materials.



#### ● Artificial photosynthesis

We have succeeded in the direct synthesis of methane and other hydrocarbons from water and CO<sub>2</sub> using a gas diffusion electrode loaded with our original catalysts.

We will continue developing the gas diffusion electrode to advance research on artificial photosynthesis. By 2030, we will establish technology to produce valuable materials such as hydrocarbons and alcohols from water and CO<sub>2</sub> using renewable energy sources with high efficiency. Through the reuse of CO<sub>2</sub>, we will contribute to realizing a sustainable society.



## Waste Reduction

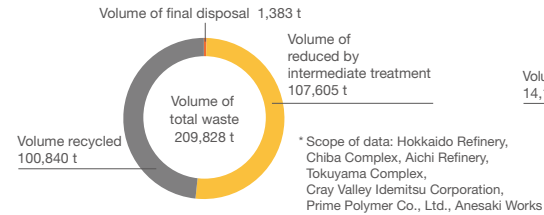
### Concept of Waste Reduction

Idemitsu Group works on reducing environmental impact by reducing the volume of industrial waste generation and by promoting the reuse of raw materials and the utilization of recycled raw materials from the perspective of the effective use of resources.

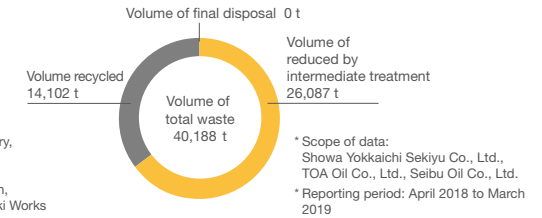
Major wastes generated by our businesses include waste catalysts used in refining processes at refineries, sludge from tank cleaning, and sludge from wastewater treatment facilities. On the other hand, we reduce the volume of these wastes and make them harmless through intermediate treatment such as incineration, dehydration and dissolution, and promote their reuse as raw material for cement, continuing "zero emissions" to reduce the final disposal volume of wastes to 1% or less.

#### ■ Breakdown of industrial waste disposal (FY2018)

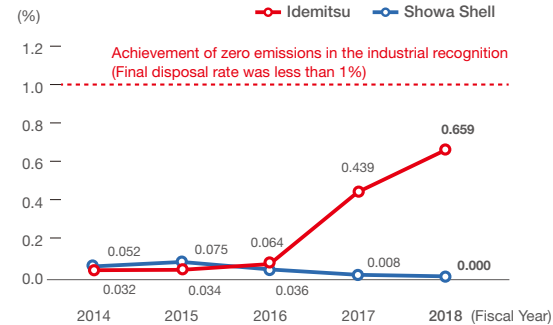
Idemitsu



Showa Shell



#### ■ Final disposal rate at group refineries



\* The final disposal rate at Idemitsu increased significantly since FY2017. This was mainly due to the disposal of materials generated by the removal of the oil refining equipment (suspended in March 2014) and others in Tokuyama Complex. The disposal is scheduled to be completed by FY2020.

\* Scope of Idemitsu's data: Hokkaido Refinery, Chiba Complex, Aichi Refinery, Tokuyama Complex, Cray Valley Idemitsu Corporation, Prime Polymer Co. Ltd., Anesaki Works

\* Scope of Showa Shell's data: Showa Yokkaichi Sekiyu Co., Ltd., TOA Oil Co., Ltd., Seibu Oil Co., Ltd.



## Water Management

### Concept of Utilization of Water Resources

The problem of water resources in the world has become serious. It is said that more than two billion people are unable to obtain safe drinking water. Japan has abundant water resources, and so it is rare to face a severe water shortage problem. However, there are many countries and regions overseas where water resources are depleted. Idemitsu Group is committed to the efficient use of water resources, as we operate business in areas with high water stress.

In addition to conventional water risk assessments, we have begun to identify and review risks of droughts and flood at some of our complexes, with reference to AQUEDUCT issued by the World Resources Institute (WRI) and information provided by the Ministry of Land, Infrastructure and Transport. In Japan, the risk of flooding is high, and damage is expected to increase due to climate change in the future. Therefore, we are working to strengthen related infrastructure facilities. (Concept of Climate Change Adaptation on page 21)

### Examples of Specific Initiatives

#### Strengthening of Water Recycling at Refineries and Complexes

Our refineries and complexes, which use a large amount of water, are working on reducing their water consumption.

A certain amount of water (seawater and fresh water) is required to cool the process fluid during the oil refining process at refineries. Fresh water (hot water) used for cooling is circulated in an air-cooled condenser for cooling, and is used again as cooling water for the process fluid to reduce the impact on the natural environment. As a water user, we will make further efforts to recycle water resources.

#### Recycling of industrial water (FY2018)

	Idemitsu	Showa Shell
Industrial water intake (thousand t)	59,281	40,316
Recycled (thousand t)	543,645	1,144,821
Recycling rate (%)	90.2	96.6

\* Scope of Idemitsu's data: Hokkaido Refinery, Chiba Complex, Aichi Refinery, Tokuyama Complex, Cray Valley Idemitsu Corporation, Prime Polymer Co., Ltd., Anesaki Works

\* Scope of Showa Shell's data: Showa Yokkaichi Sekiyu Co., Ltd., TOA Oil Co., Ltd., Seibu Oil Co., Ltd.

### Reduction of Water Consumption by Collaboration with Other Companies

At Aichi Refinery, we are working on reducing water consumption by sharing cold water with other companies through cooperation within the industrial complex. This is an initiative supported by the Research Association of Refinery Integration for Group-Operation (RING). By effectively using the chilled water discharged from the LNG vaporizer of Chita LNG Co., Ltd., which is adjacent to the complex, as process cooling water, we are contributing to the reduction of water intake in the Chita area as a whole.

#### ■ Chilled water supply through cooperation within the industrial complex

